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Carey

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(54) **ON-AXIS COLLIMATOR REFLECTOR**

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(58) **Field of Classification Search** 362/3, 10, 362/16, 296.01
See application file for complete search history.

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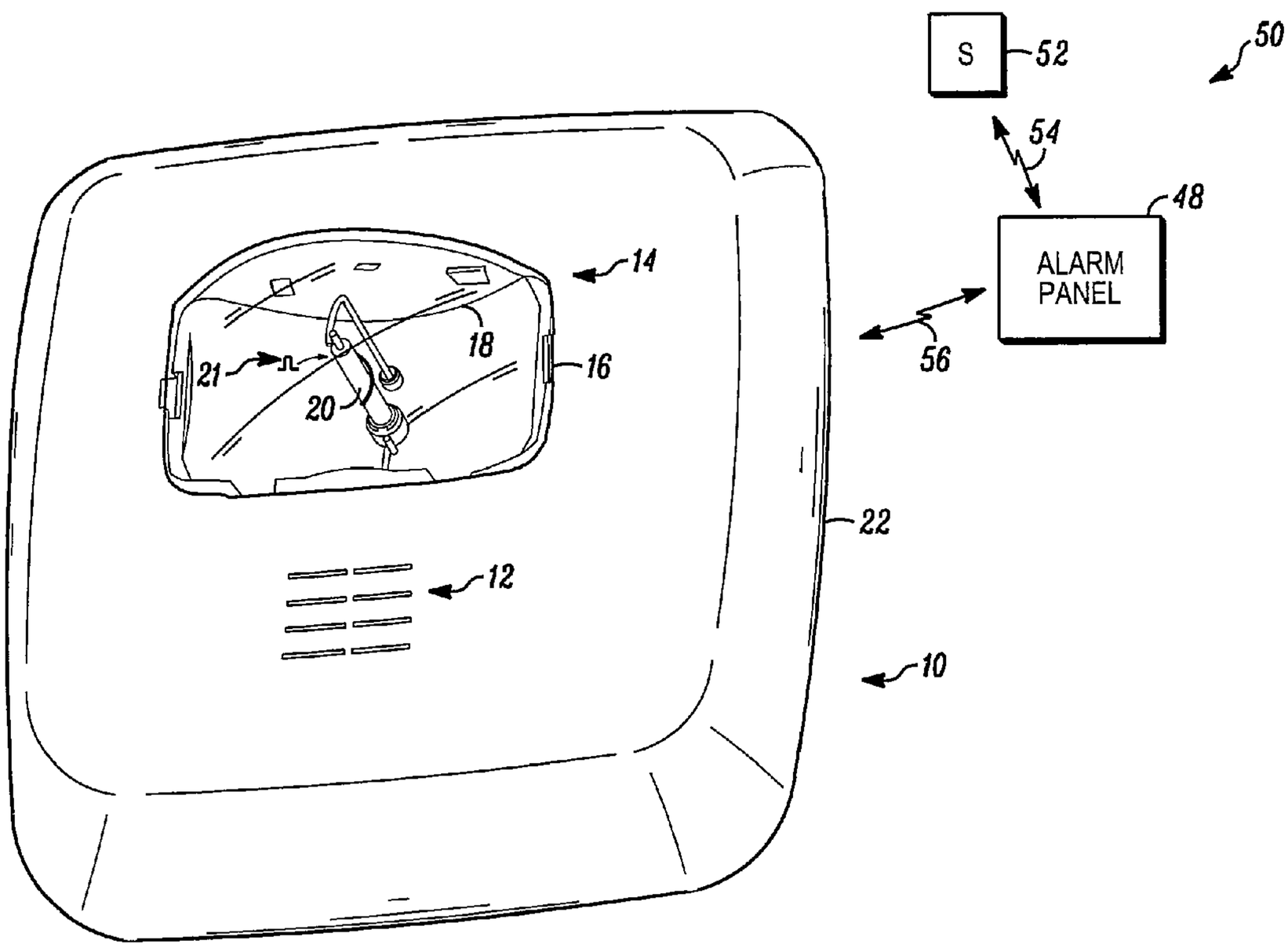
(57) **ABSTRACT**

An annunciator is provided. The annunciator includes a parabolic reflector formed from an insulating material, a reflective layer of metal disposed on a surface of the reflector, a high voltage strobe lamp disposed at a focal point of the reflector with a set of conductors of the strobe lamp extending through a center aperture of the reflector and a portion of the reflector proximate the aperture devoid of metallization.

17 Claims, 3 Drawing Sheets



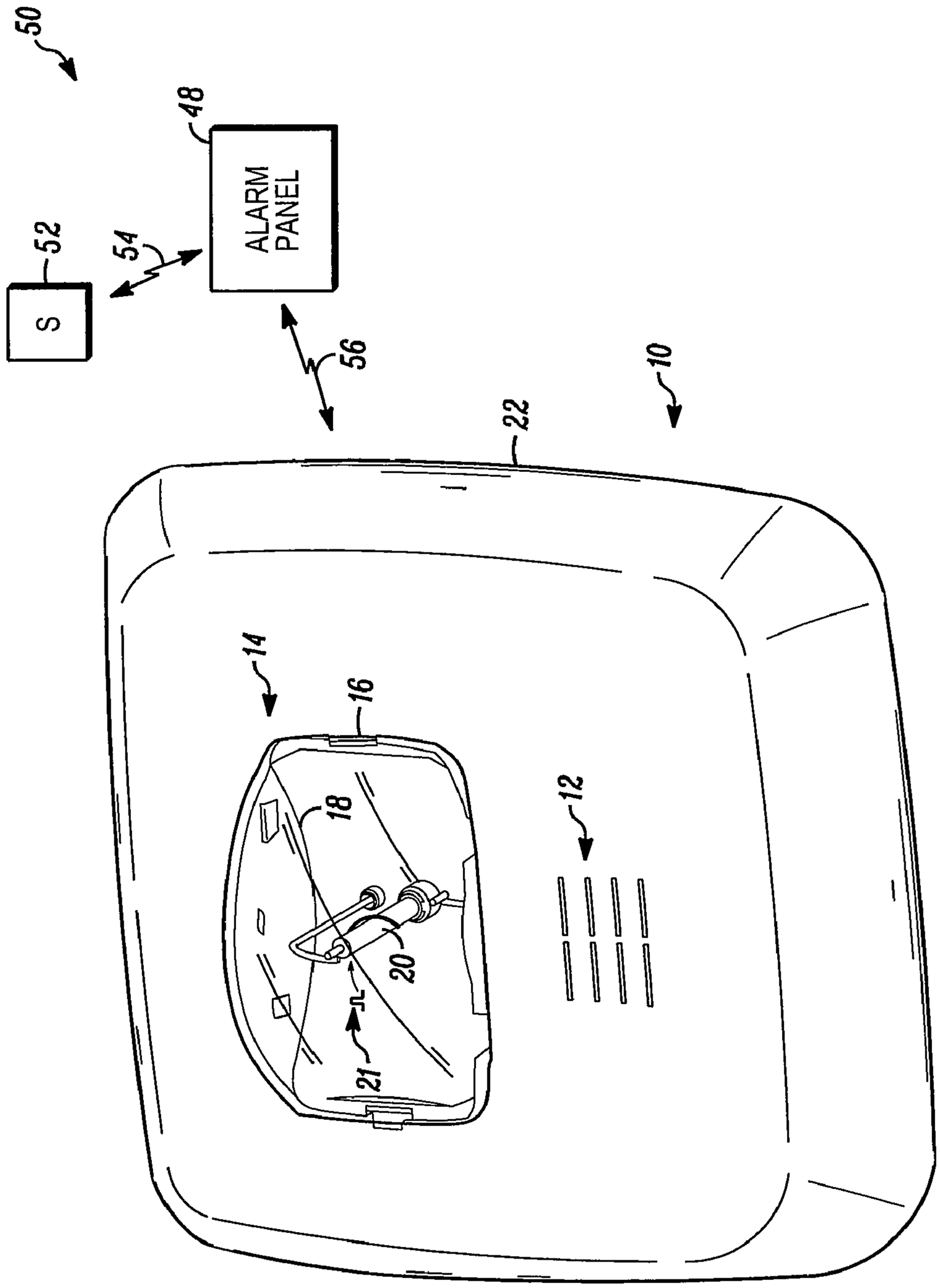


FIG. 1

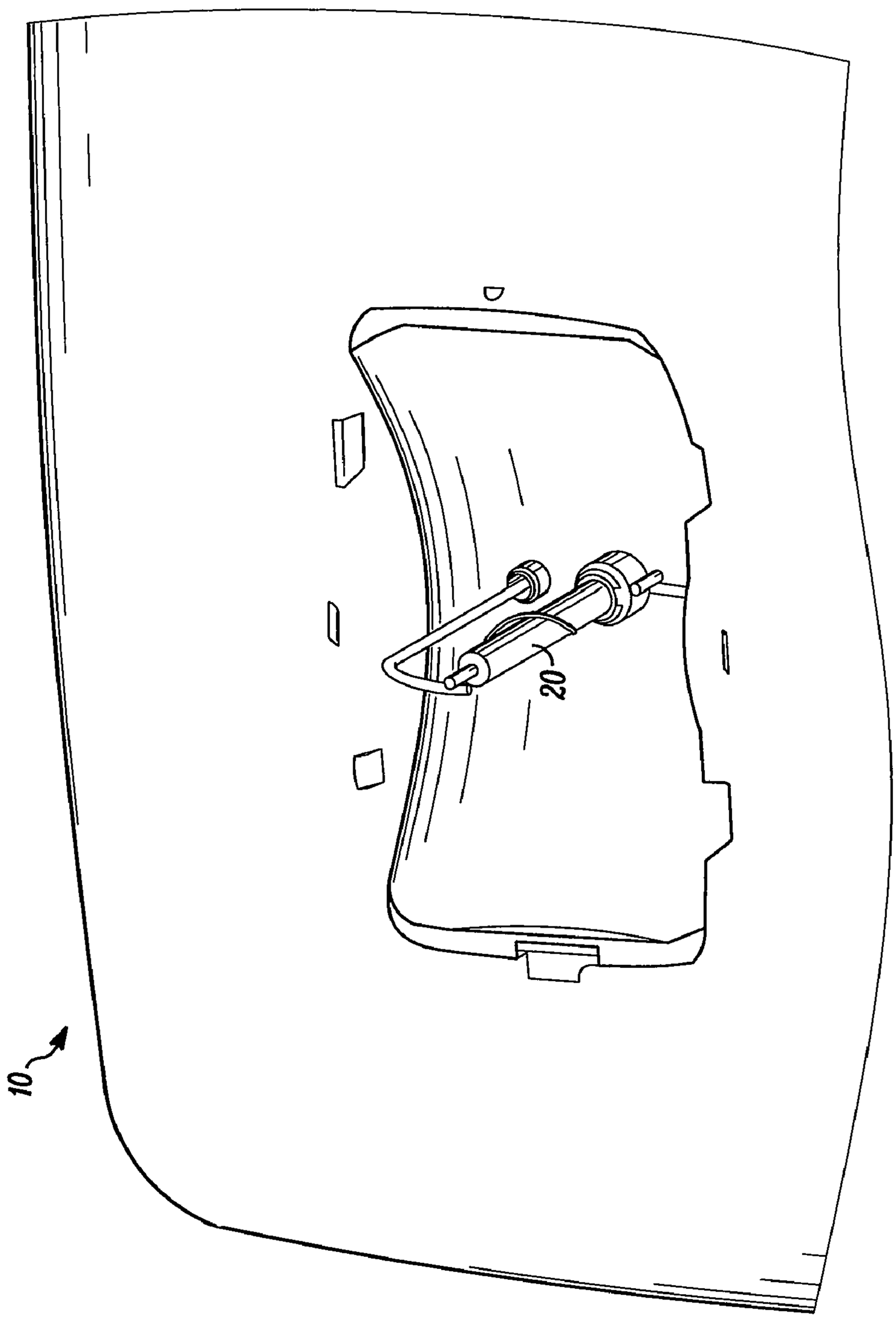


FIG. 2

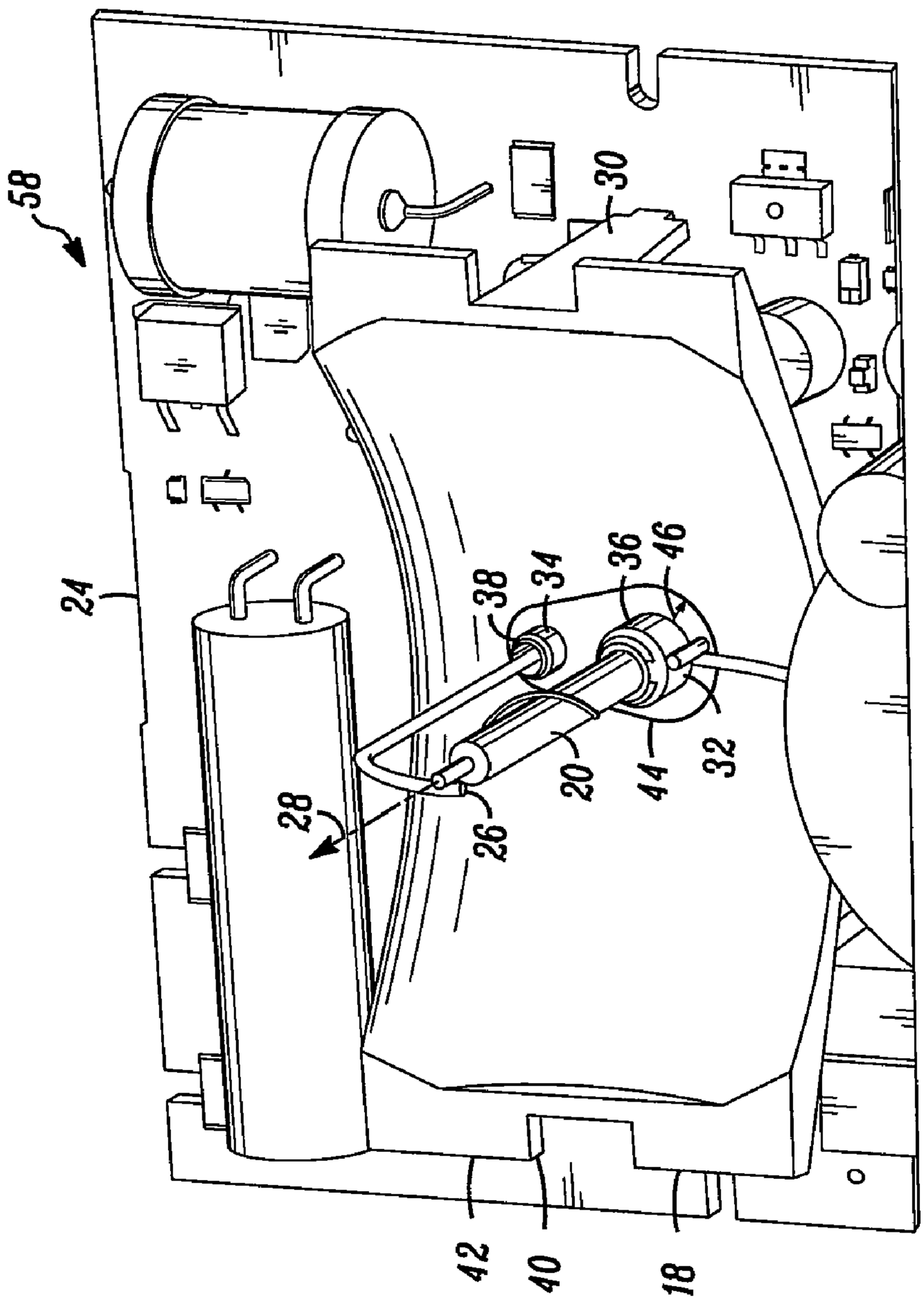


FIG. 3

ON-AXIS COLLIMATOR REFLECTOR

FIELD OF THE INVENTION

The field of the invention relates to strobe lamps and more particularly to strobe lamps for security system annunciators.

BACKGROUND OF THE INVENTION

Annunciators can often serve a very important purpose in security systems. For example, security lapses can often represent risk to human life. Annunciators can function to notify occupants of the existence of the lapse as well the type of lapse.

Annunciators can be audible or visual or both. However, in order to accommodate persons with visual or auditory impairments, annunciators for security systems usually include both audible and visual alerting devices.

In order to reduce costs, security systems are often provided with a number of annunciators, sensors and access control devices interconnected with a control panel via radio frequency links. In some cases, these devices are battery powered.

In order to extend battery life, annunciators used in such systems must be constructed to use as little battery energy as possible. One solution to this problem has been to use strobe lights for visual annunciation.

In general, a strobe light consumes significantly less energy than a conventional fluorescent or incandescent light source. The low energy consumption results from the low cycle time of a strobe light and also because of the brilliant contrast produced when the strobed light flash occurs.

In order to further reduce energy consumption, strobe lights are also often used with collimating reflectors that collimate the light from the strobe into a light diffusing lens. Collimating the light from the strobe onto a diffusing lens causes the light source to appear much larger than the actual light emitting source presented by the strobe light. Because of the importance of strobe lights in security systems, there is a need for better methods of constructing such devices.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a front perspective view of an annunciator in accordance with an illustrated embodiment of the invention;

FIG. **2** is a close-up view of the annunciator of FIG. **1** with the lens removed; and

FIG. **3** is a close-up view of the annunciator of FIG. **1** with the cover removed;

DETAILED DESCRIPTION OF AN ILLUSTRATED EMBODIMENT OF THE INVENTION

FIG. **1** depicts a security system **50** shown generally in accordance with an illustrated embodiment of the invention. The alarm system **50** may include an alarm panel **48**, one or more sensors **52** and an alarm annunciator **10**. Under one illustrated embodiment, the alarm system **50** may be a fire alarm system. In this embodiment, the sensors **52** may be smoke or flame sensors.

In the event of a fire, the one or more sensors **52** may enter an activated state and send an alarm signal **54** to the alarm panel **48**. The alarm panel **48** may respond by sending alarm signal **56** to the annunciator **10** activating the annunciator **10**.

The annunciator **10** may include an audible transducer assembly **12** and a visual transducer assembly **14**. The visual

transducer assembly **14** includes a diffusion lens **16**, a shaped reflector **18** and a strobe light **20**. FIG. **2** shows a close-up view of the annunciator **10** with the diffusion lens **16** removed. FIG. **3** shows a close-up view of the annunciator **10** of FIG. **1** with the cover **22** also removed.

As shown in FIG. **3**, the reflector **18** and strobe light **20** are supported by a printed circuit board (PCB) **24**. Similarly, the PCB **24** supports and is attached to the cover **22**.

Included on the PCB **24** is a pulsing circuit **58** that periodically (e.g., every 2 seconds, every 5 seconds, etc.) applies a strobe voltage (i.e., high voltage pulse) **21** to the strobe light **20**. The pulsing circuit may be battery powered under control of an activating signal from the alarm panel **48**.

The reflector **18** functions to receive incident light from the strobe lamp **20** and to reflect incident light in accordance with the design objectives of the annunciator **10**. For example, the reflector **18** may have a modified parabolic shape in two or three dimensions in order to direct incident light outwards from the reflector **18** parallel to a longitudinal axis **28** of the strobe light **20** and into the diffusion lens **16**.

The reflector **18** may have a parabolic shape centered on the base of the strobe lamp **20** with a focal point of the parabola centered at a midpoint along the length of the strobe light **20**. Alternatively, the parabolic shape may be modified to reflect the fact that the strobe light **20** generates light along the finite length of a gas discharge tube and not from the point source that would otherwise define a parabola.

The reflector **18** may be supported and/or attached to the PCB **24** at a number of locations. For example, a post **30** on opposing ends of reflector **18** may be attached to the PCB **24**. The reflector **18** may also be attached via a set of apertures **32**, **34** extending through the center of the reflector **18**. In this case, an insulating bushing **36**, **38** may extend through the reflector **18** and where a conductor of the flash tube **20** and second conductor **26** may extend through the bushings **36**, **38** to form an electrical connection with a respective set of conductors on the PCB **24**.

A body **40** of the reflector **18** may be fabricated of an appropriate insulating structural material (e.g., plastic, nylon, etc.). An upper surface of the reflector **18** is coated with a metalized layer **42** of an appropriate reflective material (e.g., chrome).

One feature of the reflector **18** is an insulation stand-off region **44** that is devoid of the metallic coating **42**. The region **44** surrounds the electrical feedthrough apertures **32**, **34** of the strobe **20**. The stand-off region **44** may have an appropriate width (e.g., ⅛ inch, ¼ inch, etc.) **46** between the feedthrough conductors and metalized layer **42** to prevent electrical flashover from the electrically charged conductors of the strobe **20** to the metalized layer **42** when the strobe **20** is fired or otherwise activated. The width may be based upon the type of strobe **20**. For example, if the strobe **20** is a zenon tube, then the width may be ⅛ inch or more depending upon the voltage required and upon the type of gas used in the gas discharge tube of the strobe **20**.

The stand-off region **44** may be created using any of a number of different methods. Under a first method, the region **44** may be coated with a protective coating before a plating process that adds the metalized layer **42** to the body. After plating, the protective layer is removed. Alternatively, the entire upper surface of the body **42** may be plated and then masked for removal of the plating in the stand-off region by etching.

Under still another embodiment, the region **44** may be masked before a plating process that adds the metalized layer **42** to the masked body. After plating, the mask is removed and reused on the next reflector **18**.

The stand-off region **44** simplifies the construction of strobe lamps. By providing the stand-off region **44**, the bushings **36**, **38** can be considerably smaller with a lower flash-over rating.

A specific embodiment of a visual annunciator has been described for the purpose of illustrating the manner in which the invention is made and used. It should be understood that the implementation of other variations and modifications of the invention and its various aspects will be apparent to one skilled in the art, and that the invention is not limited by the specific embodiments described. Therefore, it is contemplated to cover the present invention and any and all modifications, variations, or equivalents that fall within the true spirit and scope of the basic underlying principles disclosed and claimed herein.

The invention claimed is:

1. A device comprising:

a parabolic reflector formed from an insulating material;

a reflective layer of metal disposed on a surface of the reflector;

a strobe lamp disposed at a focal point of the reflector with a pair of conductors of the strobe lamp extending through a center aperture of the reflector; and

a oblong-shaped portion of the reflector proximate to and surrounding the aperture that is devoid of metallization and with a conductor of the pair of conductors that extract through each end of the oblong-shaped portion.

2. The device as in claim **1** wherein the strobe lamp further comprises a Xenon bulb.

3. The device as in claim **1** further comprising a printed circuit board that supports the reflector and strobe lamp.

4. The device as in claim **1** further comprising an annunciator for a security system.

5. The device as in claim **1** wherein the parabolic reflector defines a parabola in three dimensions.

6. A device comprising:

a shaped reflector formed from an insulating material;

a reflective layer of metal disposed on a surface of the reflector;

a lamp disposed at a focal point of the shaped reflector with two conductors of the lamp extending through a center aperture of the reflector; and

an oblong-shaped portion of the reflector proximate the aperture devoid of metallization and with a conductor of the two conductors extending through each end of the oblong-shaped portion.

7. The device as in claim **6** wherein the parabolic reflector defines a parabola in a single dimension.

8. The device as in claim **7** wherein the shape of the reflector is parabolic.

9. The device as in claim **7** wherein the lamp is strobe lamp.

10. The device as in claim **9** wherein the strobe lamp further comprises a Xenon bulb.

11. The device as in claim **7** further comprising a printed circuit board that supports the reflector and strobe lamp.

12. The device as in claim **7** further comprising an annunciator for a security system.

13. A device comprising:

a collimating reflector formed from an insulating material;

a reflective layer of metal disposed on a surface of the reflector;

a high voltage lamp disposed at a focal point of the collimating reflector with a set of two conductors of the strobe lamp extending through a center aperture of the reflector; and

an oblong-shaped portion of the reflector proximate the aperture devoid of metallization with a conductor of the two conductors extending through each end of the oblong-shaped portion.

14. The device as in claim **13** wherein the parabolic reflector defines a parabola in three dimensions.

15. The device as in claim **13** further comprising an annunciator for a security system.

16. The device as in claim **13** wherein the lamp is strobe lamp.

17. The device as in claim **16** wherein the strobe lamp further comprises a Xenon bulb.

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